STORY OF ILLINOIS No. 13

POISON IVY and POISON SUMAC

GLEN S. WINTERRINGER

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STORY OF ILLINOIS SERIES, NO. 13

POISON-IVY AND POISON-SUMAC

Their growth habits and variations, including distribution in Canada, Mexico, Central America and the United States with special reference to Illinois.

By
GLEN S. WINTERRINGER

Printed by authority of the State of Illinois

1963

POISON-IVY AND POISON-SUMAC

CONTENTS

ACKNOWLEDGMENTS

I am grateful to all of those who took time to read the manuscript of this booklet and who made useful, critical comments during its preparation. Special thanks are due Thorne Deuel, Milton Thompson, and particularly Orvetta Robinson. I am indebted to Dr. Virginius Chase of East Peoria, Illinois, Dr. P. V. Dilts of Springfield, Dr. Dale M. Smith of the University of Illinois and William T. Gillis of Michigan State University, all of whom examined the manuscript from a professional viewpoint.

The cover was designed by Betty Madden, who assisted with other drawings in the booklet; and the maps were prepared by Faye Garvue. Typing by Twyla King is very much appreciated. All photographs were made by Charles Hodge with the exception of Figures 10 and 16 by John Gerard of Alton, Illinois.

GLEN S. WINTERRINGER
Curator of Botany

"Many hypotheses have been advanced to explain the significance of toxic substances produced in plants, as, that they are developed to protect the plants against herbivorous animals, are waste products, are stages in the process of metabolism. Of these suggestions the first appears the least acceptable and the last the most plausible."

INTRODUCTION

This booklet is presented as a service for the people of Illinois and many thousands of others who may find useful information in its pages.

An attempt is made to tell the story of poison-ivy and poison-sumac in word and picture. There is no intention, in preparing this work, to revise the botanical or taxonomic status of the plants discussed.

More than ever before people have more leisure time and more cars to carry them to distant places where they can visit areas previously not available or open to the public. For full use and enjoyment of these outdoor areas we need to know about our natural surroundings and some native plants it is best to avoid. Poison-ivy, poison-oak and poison-sumac are known to many; and those who do not recognize these plants will find it profitable to learn about them. Thousands of cases of ivy poisoning or dermatitis occur each year, many of which could be avoided if care and precaution are used.

There are about 2400 species or kinds of wild or uncultivated seed-producing plants in Illinois. Of all these, poison-ivy is known to cause more distress and unpleasant hours than any other. The great abundance of poison-ivy, the many places in which it grows, and lack of information about the plant were considered important enough to inspire this booklet. Learning more about things in our environment, pleasant and otherwise, will help to increase our happiness, pleasure and well-being. It is hoped that this publication will accomplish some of these things.

EARLY HISTORY OF POISON-IVY

There are fossil records from the Oligocene Epoch, nearly forty million years ago, of a type of poison-oak from southwestern Oregon. In rocks ten to twenty million years old some fossils of plants similar to poison-ivy have been found in northern California. Poison-ivy, poison-oak and poison-sumac were established as living plants destined to be troublesome long before Columbus touched the island shores of North America. In many localities these plants of modern times are abundant and they continue to thrive. In North America poison-ivy is distributed from eastern and southern Canada south throughout the United States, into Mexico, northern Guatemala and the West Indies. It is found in western China, in Japan, the Kurile Islands and Taiwan (Formosa).

The Latin name for the sumacs as a group or genus is RHUS, and both poison-ivy and poison-sumac belong in it botanically. There are various opinions expressed regarding the early use and meaning of the word "Rhus", but it is probably Greek in origin, or at least it may have been derived from some ancient language of Asia Minor. Pedanios Dioscorides,* A.D. 40-90, discussed uses of RHUS in his herbal, and these included dyeing, tanning, cooking, and especially the medicinal properties. Although the herbal of Dioscorides, by modern standards, was of questionable value, it was highly regarded as a reference for many centuries. Both Theophrastus (372-288 B.C.) and Pliny the Elder (A.D. 23-79) described sumacs, but these were not the same species later found in North America. However a common sumac of the Mediterranean region is *Rhus coriaria* L. and it is quite likely that this is the plant to which the early Greek and Roman writers referred. The herbals and herbalists, as one might expect, were concerned with medicinal properties of plants, and many writers did not know much about the plants themselves. Later on the herbalists actually used plant specimens for their descriptions and drawings. Most of the first-recorded information about plants is found in herbals. These early herbals were not completely reliable, however, since they were based partly on superstition and partly on imagined medicinal value of the plants discussed. Accurate botanical description was merely incidental. The herb-medicine value of a plant plus a little quackery was the most important reason for preparing herbals, and every known plant was supposed to have some real or imaginary medicinal use.

The following continued brief account of the history of sumacs will give some idea of the many centuries these plants have been discussed in botanical literature. No attempt is made here to include all of the dates and authors who wrote about the sumacs, but it should be kept in mind that, from early Greek times to the present, these shrubs have been subjects of interest and research. The names of plants in this section of the booklet represent only *some* of the name changes made in studying poison-ivy and its relatives. A complete report would fill many pages and the interested reader should consult sources of technical information in the list of references.

* See *American Midland Naturalist*, 19:265-333, for historical references.

John Gerarde's HERBALL OR GENERALL HISTORIE OF PLANTS IN 1597 contained an account of *Rhus coriaria* L., the Mediterranean or "coriars sumac." By the early part of the seventeenth century some American sumacs were being described or mentioned in botanical writing of that time. Casper Bauhin described a North American smooth sumac, later named *Rhus glabra,* in his PRODROMUS (1620). Bauhin, however, thought the plant was from Brazil rather than North America. Very few early European botanists, professional or amateur, collected plants from North America, but specimens were sent to them for identification and naming. As a result, plants and often localities were confused.

Captain John Smith, about 1609, is said to have given the first description of a plant, probably from what is now Virginia, which was "little different from our English yvie; but being touched causeth reddness, itchinge, and lastly blysters, —". The romantic captain, however, was not noted for his wholly accurate reports and observations. Not long after this, in 1635, Jacob Cornut, a Parisian Doctor of Medicine, named poison-ivy in his description and study of Canadian plants. Cornut called the ivy plant *Edera trifolia canadensis* (three-leaved Canadian ivy), and its illustration in his HISTORY OF CANADIAN PLANTS, a copy of which is in the University of Illinois Library, is easily recognized by those who see it over 300 years later. Some fine reproductions of sumac illustrations from very old botanical books can be seen in A SHORT HISTORY OF RHUS TO THE TIME OF LINNAEUS by Fred and Elizabeth Barkley, a reference given at the close of this booklet.

Note that Cornut called his plant "Edera." An ancient Latin name for ivy is "Hedera" and use of such a name by Cornut was unfortunate. The word "ivy" has a general meaning and may be used to refer to several plants. English ivy, *Hedera helix* L., is a well-known climbing plant with aerial roots and three-*lobed* leaves which sometimes irritate the skin of susceptible persons. English ivy, in the Ginseng Family or Araliaceae, is not closely related botanically to poison-ivy which might be more accurately called a three-leaved, poison-sumac. It may be that early students of the flora saw resemblances to poison-ivy in the climbing habit, aerial roots, and three-lobed leaves of English ivy with which they were familiar.

Joseph Tournefort, in 1700, renamed the plant which Cornut had called *Edera trifolia canadensis* by calling it *Toxicodendron triphyllon glabrum* (smooth, three-leaflet poison wood). He divided the sumacs into two groups: those having 7-13 pinnate leaflets (feather-like) and those with only three leaflets. The pinnate-leaved plants were placed in a group or genus RHUS, and those with three leaflets in the genus TOXICODENDRON. In 1753 Carolus Linnaeus changed the names Tournefort had used and placed all of the pinnate-leaved sumacs *and* poison-ivy in one group which he called RHUS. Then in 1804 Philip Miller, in THE GARDENER'S DICTIONARY which went through revision and many editions, decided there should be two groups of plants based on a study of their small flowers. One group he called RHUS, whose individual flowers had both stamens and pistils. The second group was named

TOXICODENDRON which had staminate flowers (stamens and pollen) on one plant and the pistillate flowers (ovules and seeds) on a separate plant. These differences in flowers are characteristics which botanists use to help identify the kinds or species of flowering plants. Philip Miller had evidently made some careful observations, but the problems were not completely solved.

John K. Small, in 1933, placed the poisonous species of sumac in one section which he called TOXICODENDRON and the harmless (non-poisonous) ones in another section named RHUS. For our purpose this might be acceptable, but most botanists will not agree with this arrangement. In the present booklet all sumacs and poison-ivy are included botanically in one group or genus which we call RHUS. In Illinois we recognize seven species or kinds of RHUS, including poison-ivy and poison-sumac. About 150 species of RHUS are known today from all parts of the earth.

Centuries ago botanists did not have the quick communication system available to scientists today. They sometimes used the same scientific (Latin) name for very *different* plants; or the naming process was reversed and the *same* plant may have been given different names. Latin is a classical language understood and read by scientists all over the world regardless of nationality; thus it furnishes a uniform means for describing and naming plants and animals. The hundreds of thousands of local and common names, in all languages, for the earth's living things would make it nearly impossible to establish the basis for a useful and orderly system of classification and study. The early botanists were not careless; their various names for plants mentioned in this discussion merely reflect different viewpoints. During the early centuries there were no established rules for classifying and naming plants. Much confusion resulted which is now avoided through regulations, communications, and available published reports. Today we have the INTERNATIONAL RULES OF BOTANICAL NOMENCLATURE and every attempt is made to keep order in naming plants, including thousands of new ones each year.

HOW MANY KINDS OF POISON-IVY

Though many botanists now include poison-ivy, poison-oak, and poison-sumac in the genus RHUS this does not indicate complete agreement on or about the kinds or species and variations of the plants included. Some careful studies have been made in recent years and Fred A. Barkley (1937) separated the sumacs into two groups, one known as TOXICODENDRON, in which he included poison-ivy, and the other as RHUS. William T. Gillis, in his paper on TAXONOMIC PROBLEMS IN POISON-IVY (1960), follows Barkley with his own statement: "Poison ivy thus belongs to the genus Toxicodendron" and "—the correct name for poison-ivy is *Toxicodendron radicans* (L). Kuntze—". Since this present booklet is not an attempt to settle the technical problems involved with the scientific naming of poison-ivy and in view of many opinions about names, we have made a choice in order to proceed with our story.

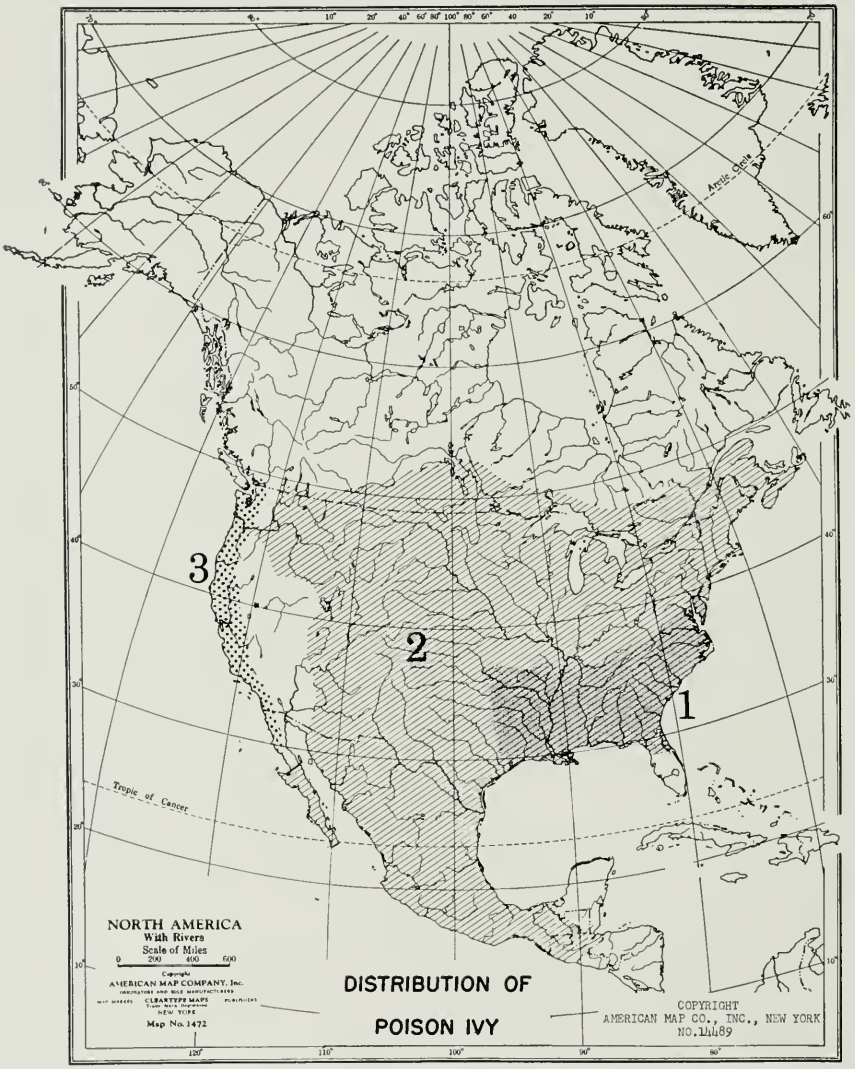

Fig. 1. This map is intended to show distribution of poison-ivy, and eastern and western poison-oak. Poison-ivy is not limited to the United States alone and its range extends into Canada and Mexico. Area (1) is the southeastern poison-oak; Area (2) is the common poison-ivy found in the central states; and Area (3) is the Pacific Coast poison-oak. Range of these three related plants may overlap, but each occupies a distinct habitat or area of growth.

Thus the name RHUS RADICANS L. rather than TOXICODENDRON will be used in the following pages to identify poison-ivy. A careful study of poison-ivy has been made difficult by use of many common and local names and failure of most people to consider the great variations of these plants in appearance and growth habit. Professional botanists admit that many of the technical points upon which species or kinds and varieties of poison-ivy have been named are due to growth conditions or the part of the country in which the plants grow, but Edward L. Greene and others published many names for what is now known as *Rhus radicans* L. or poison-ivy.

To indicate the distribution and similarity of plants of the poison-ivy complex, let us divide the continental United States into three regions, making the following artificial areas: (1) east coast south of New Jersey and including the southeastern Gulf Coast States; (2) area east of the Cascade Mountains and Great Basin extending to the east coast; (3) northern part of Lower California and western parts of the Pacific Coast States (Map, Fig. 1). In Region (1) the eastern poison-oak plant has been named *Rhus quercifolia* (Michx.) Steud. with various common, local names as: cow-itch, poison-tree, poison-mercury, poison-ivy and poison oak. The three leaflets are somewhat hairy and lobed and the *shrubby* plant does not usually climb. It is most likely to be found growing in sandy, barren land. In Region (2) the name of the poison-ivy plant is *Rhus radicans* L. (radicans means climbing) and this is the poison-ivy widely distributed in Illinois. It grows in fields, woods, along roadsides and in fencerows as a shrub or climbing plant with three smooth leaflets (Figs. 2 and 3). The aerial or adventitious roots allow it to become attached to posts and trees (Figs. 4 and 5). In Region (3) the western poison-oak may be a shrub or it may climb, by means of aerial roots, on any support. This lobe-leaved poison-oak, *Rhus diversiloba* T. & G., grows from northern Lower California through California, Oregon, Washington and Vancouver Island. The poison-oak of this region was discovered about 1830 by David Douglas at Fort Vancouver on the Columbia River. In 1832 the same kind of poisonous plant was found in the San Francisco area. In the MANUAL OF THE FLOWERING PLANTS OF CALIFORNIA (1925) W. L. Jepson says this plant is more widely distributed in California than any other shrub.

Thus we have three similar and closely related poisonous plants growing in different geographical regions of the United States. Each of the three groups of plants has its own botanical (Latin) name and a long list of common names. All of these plants can be considered undesirable since each of them produces the poisonous sap which causes dermatitis or ivy poisoning. All of them usually have three, variable leaflets in one leaf, and they produce bunches of small, grayish-white fruits or drupes bearing the seeds (Fig. 7). The writer does not say the three kinds of plants are identical. Differences in the flowers, pollen, flowering periods, root hairs and wood anatomy have been studied, and these variations indicate that there is a need for more careful and continued study.

Since it is probably impossible to separate absolutely, within definite geographical areas, the distribution of the three similar and closely related poisonous plants, we have used the map (Fig. 1) merely to indicate areas in which different names have been given to these three plants. There is some overlap in their range of distribution but not in habitat and both *Rhus radicans* L. and *Rhus diversiloba* T. & G. are reported by Leroy Abrams in the ILLUSTRATED FLORA OF THE PACIFIC STATES (Vol. 3, 1951). In southern United States *Rhus radicans* and *Rhus quercifolia* overlap in range in the Gulf Coast States from northern Florida west to Louisiana and East Texas (GRAY'S MANUAL OF BOTANY, 1950). In the HANDBOOK OF PLANTS OF THE COLORADO FRONT RANGE by William A. Weber, and in FLOWERING PLANTS AND FERNS OF ARIZONA, by Thomas H. Kearney and Robert H. Peebles, only *Rhus radicans* is named as the *recognized species* of poison-ivy in those states.

Hybrids might be expected where two of the three kinds of poison-ivy mentioned in this booklet adjoin or overlap in range. All poison-ivy is pollinated by insects, and if natural hybrids are found this will help to establish a close relationship. Experiments with artificial hybridization have been carried out by William T. Gillis who reports that he has been successful with cross-pollination experiments. It may surprise the reader that scientific research is being carried out to discover more about the genetics of these undesirable plants and about the nature of their poison. Dr. Albert M. Kligman credits Bedford S. Shelmire with some excellent biological research on the latter subject.

POISON-IVY AND POISON-SUMAC IN ILLINOIS

Poison-Ivy

Regardless of arguments and opinions concerning the scientific names of poison-ivy, poison-oak and poison-sumac, we can be sure that the important thing is to know where they grow and LEARN HOW TO IDENTIFY AND AVOID THEM.

Poison-ivy, *Rhus radicans* L., is abundant and widely distributed in Illinois. This plant pest has been recorded from every county of the state. The many places in which the ivy grows would indicate that it adapts easily to various soil, water, and light conditions; and the plant itself is as variable as the places or habitats in which it grows. This helps explain the differences encountered in studying and identifying poison-ivy.

The perennial, underground roots send up sprouts or new growth after upper, woody parts have been cut. This young growth from trimmed or mowed plants is always poisonous to touch. Additional new growth develops from the stems or twigs each year; and, when once established, the plant is difficult to eradicate. The aerial or adventitious roots, growing from woody stems above ground, enable the plant to cling to any support (Figs. 4 and 5, 8 and 9). The abundance of poison-ivy along unmowed roadsides, and especially in fencerows, indicates that it thrives in such "protected" places. The

Fig. 2. (Upper). A twig of poison-ivy (*Rhus radicans* L.) with typical three-leaflet leaves alternately arranged. Compare these with box elder in Fig. 13 and note close resemblance.

Fig. 3. (Lower). A group of poison-ivy leaves taken at random from different plants in the vicinity of Springfield, Illinois. Since noticeable variations show in the form of the leaflets, this photo may be useful for identification of poison-ivy plants.

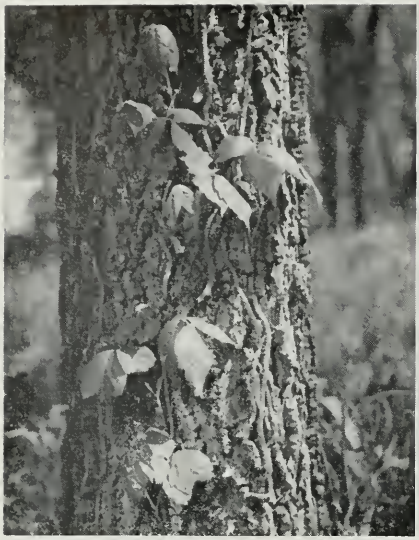

Fig. 4. (Left). Young, woody twigs of poison-ivy climbing by means of aerial roots attached to a tree trunk. Compare this with the huge, woody vines in Fig. 10.

Fig. 5. (Right). This thick growth of poison-ivy on a utility pole was found on a city street. Such growth can be controlled or killed.

entire plant may vary from sprawling forms in shady woodlands to the large, shrubby growth along roadsides (Fig. 11), and even huge, woody vines on trees (Fig. 10).

There are three, smooth leaflets in one leaf which is attached to the twig by a single leaf stalk or petiole. A study of the photograph in Fig. 3 will indicate the very noticeable variations in shape, leaflet edges or margins, and size of the leaflets. Thickness of the leaflets varies according to places in which the plant grows. The leaves and leaflets of shady woodland specimens may be large and thin while those of exposed, sunny places are sometimes smaller and somewhat thicker. The leaf itself is attached to the twig or branch in a *scattered* or *alternate* arrangement (Fig. 2). The leaf arrangement will help to identify poison-ivy since some harmless, opposite-leaved plants such as common box elder seedlings and even box elder trees are often confused with it (Fig. 13). Pouch-like, reddish growths sometimes seen on the shiny leaves of poison-ivy are plant galls caused by gall insects after their eggs are laid in the leaf tissue. Some gall insects, generally tiny gall mites, find the ivy leaves with their poisonous sap quite suitable for their purpose and suffer no ill effects.

Fig. 6. (Left). Small, white flowers of poison-ivy in tight, grape-like bunches. Grayish-white fruits bearing seeds will develop late in summer. More poison-ivy plants will probably grow from these seeds.

Fig. 7. (Right). Poison-ivy fruits or drupes as they appear in early winter. Sometimes these drupes remain on the bare shrubs all winter, and birds may eat them when snow is deep. Compare with poison-sumac in Fig. 16.

Fig. 8. (Left). Poison-ivy growing on a fence post in a field and as low growth among grasses.

Fig. 9. (Right). Older growth of poison-ivy on a fence post along a country roadside. Plants like this along fence rows are protected from plowing and cutting and often attain large size.

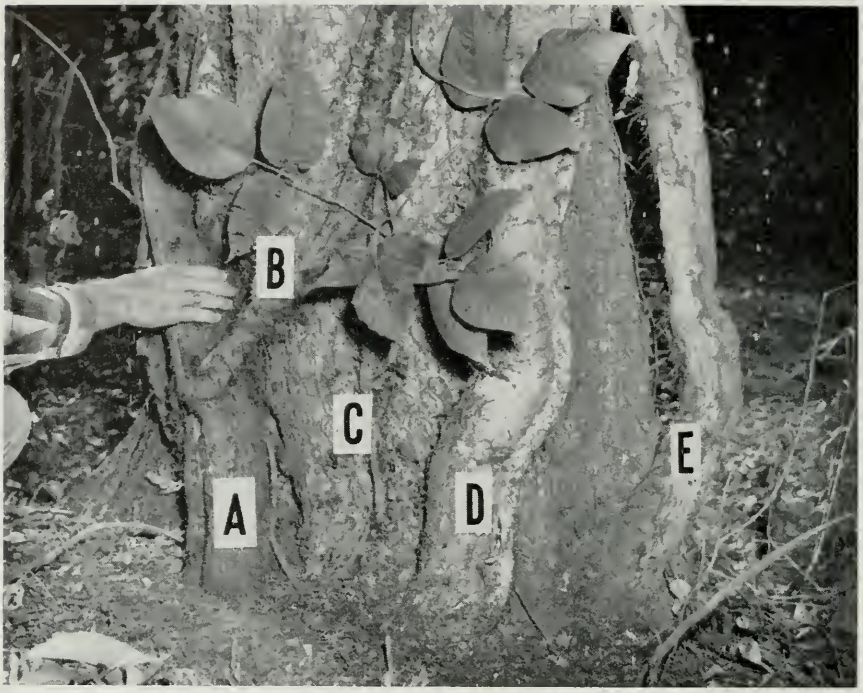

Fig. 10. Note thick, woody stems of this old poison-ivy growth at A, B, C, D, and E. The climbing vines grew into the top of the elm tree to which they became attached by aerial roots. Photo made near Grafton in Jersey County, Illinois, by John Gerard. Mr. Gerard reported a poison-ivy growth in Missouri with a woody "trunk" a foot in circumference.

In early summer small, greenish-white flowers with five petals appear in close, grape-like clusters or bunches on short, slender stems from the axil of a leaf (Fig. 6). The axil is the angle formed by the leaf stalk at the point of attachment to the twig (Figs. 2 and 6). By contrast, the flowers of poison-sumac, *Rhus vernix* L., are loosely arranged in erect panicles when in flower during June; later, as the fruit matures, the panicle hangs or droops (Fig. 16). Honey bees collect pollen and nectar from the flowers of these poisonous plants with no injury to themselves and the honey is HARMLESS. Bees, according to Gillis, evidently seek these flowers and certainly they do not avoid them. These same insects assist with cross pollination and eventual seed formation. As was proved in early experiments, pollen from poison-ivy flowers does not cause dermatitis when rubbed on human skin. Late in summer the flowers of both poison-ivy and poison-sumac are followed by small, grayish-white fruits or drupes containing seeds (Figs. 7 and 20). Young ivy plants often grow rapidly from seeds, and seedling plants are poisonous to touch or handle. These seedlings will grow in yards,

Fig. 11. Poison-ivy in early winter along a fence row. The abundance of these poisonous plants along a country roadside indicates that fences furnish protection from cutting and plowing. Small, white fruits of the plant were present among upper branches at the left.

gardens, and among cultivated shrubs where they generally escape hoeing and cutting. Seedlings must be pulled out; if broken off, they will continue to grow from permanent underground roots. Poison-ivy, growing among shrubs near dwellings, may remain unnoticed or unrecognized for years; and in vacant lots it often attains luxuriant growth before owners identify it or know about its poisonous character. Birds undoubtedly carry the fruits and seeds and are unharmed by eating them just as bees have no ill effects from pollen and nectar. Livestock are known to occasionally graze poison-ivy with no apparent undesirable results.

It is important to strongly emphasize the many growth and leaf forms which poison-ivy may assume, and it is difficult to describe one plant or leaf for everyone to recognize. The many variations in growth and leaf form help to account for, not only a long list of scientific names, but many local and common names as well.

Fig. 12. (Left). The HARMLESS, three-leaflet, aromatic sumac, *Rhus aromatica* Ait. is a shrub with yellowish flowers in early spring. Tight, catkin-like clusters of buds for next season's flowers are shown in the lower right. Aromatic sumac is sometimes planted as a landscape ornamental.

Fig. 13. (Right). A seedling of HARMLESS box elder, *Acer negundo* L. Its three-leaflets strongly resemble those of poison-ivy with which it is often confused. Note that the leaves are *opposite* on the twig, and in poison-ivy they are scattered or *alternate* on the twig. (See Fig. 2). Leaves on the lower part of the seedling stem are called juvenile and may not look like typical leaves on the older part. (Broken leaf stems or petioles show where leaves were removed to avoid crowding in the photo.)

In presenting one "typical" poison-ivy specimen for identification purposes, we would omit dozens of others which are not exactly like it. The old rule of "leaflets three, let it be", or "quickly flee" does not always solve the problem because many harmless, useful plants have three leaflets (Fig. 14). Of all common plants often mistaken for poison-ivy, the seedling and mature leaves of box elder, *Acer negundo* L., are most often confused. Box elder is a maple with three to five leaflets in one leaf, but its leaves are *opposite* on the twigs (Fig. 13). Poison-ivy leaves are *alternate* or scattered in their attachment on the twig or stem (Fig. 2). To illustrate poison-ivy's strong resemblance to box elder, Edward L. Greene named one of his many species of poison-ivy, *Toxicodendron negundo.* The best advice to be offered is to have someone who knows poison-ivy without doubt make identification for those who do not recognize it. Questionable plant specimens which cannot be positively identified may be sent to the Curator of Botany at the Illinois State Museum for naming and comment.

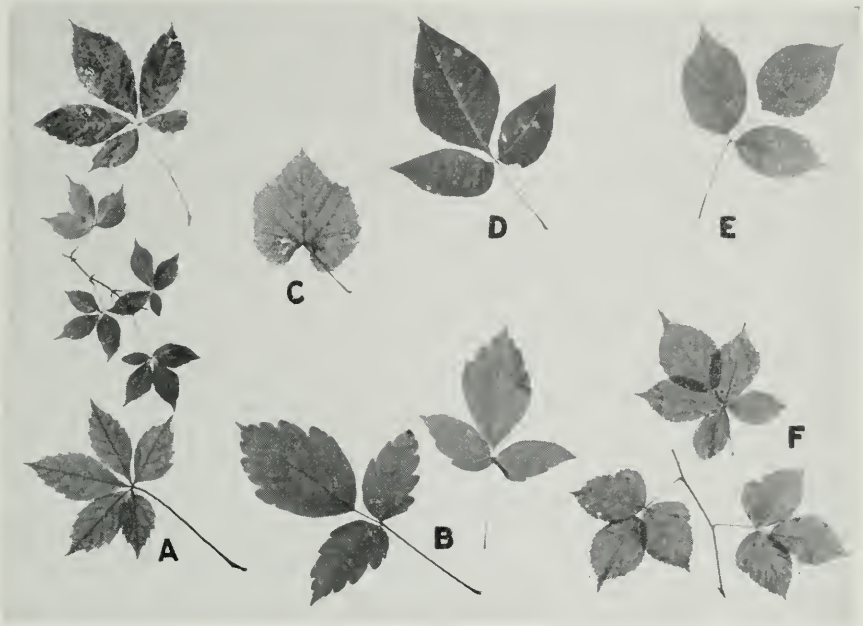

Fig. 14. Leaves of some HARMLESS plants easily mistaken for poison-ivy. (A) Woodbine or Virginia creeper is a climbing vine with tendrils ending in adhesive discs. There are generally five leaflets and sometimes only three or four on very young growth. The fruit is dark blue. (B) Box elder is confused with poison-ivy because o the three leaflets similar in shape and margin. (C) Wild grape has a simple leaf growing from climbing woody vines with tendrils and flower clusters opposite the leaves. (D) Wafer-ash is a shrub bearing seeds in a papery samara. (E) Bladder-nut is also a shrub with drooping clusters of white flowers followed by seeds in a papery, bag-like husk. (F) Wild blackberry often has three leaflets in one leaf, but spiny stems help identify this shrub.

Poison-Sumac

There is only one kind or species of poison-sumac, *Rhus vernix* L., among all of the pinnate-leaved (feather-like) sumacs in Illinois (Figs. 16 and 17). Poison-sumac, often called poison-elder, swamp-sumac, poison-ash, and poison-dogwood, is a shrub 6 to 20 feet tall. The mature leaves, made up of 7 to 13 smooth, dark green leaflets in pairs, are arranged alternately or scattered on the twigs. These paired leaflets including the single leaflet at the tip, constitute *one* pinnate *leaf* (Figs. 16 and 17). Poison-sumac is never a climbing, woody vine with aerial roots like poison-ivy. In early summer, small, yellow-green or green-white flowers are produced on slender stems from buds at the point or axil where the leaves are attached to the newly grown twigs. These flowers are in erect, loose panicles or bunches which may be eight inches long. Later in the growing season, by August or early September, these sumac flowers have developed into *hanging,* loose bunches of grayish-white fruits or

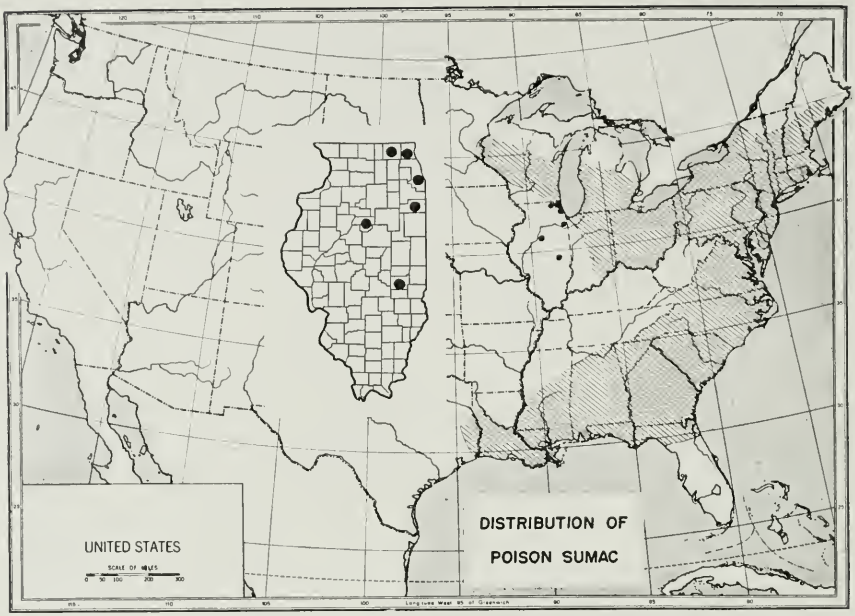

Fig. 15. Poison-sumac is found mostly east of the Mississippi River as the shaded portion of the map indicates. Extensions into part of Louisiana and East Texas, and four counties of eastern Minnesota, are notable exceptions. The shrub is uncommon in eastern Canada. An inset map of Illinois shows six counties in which poison-sumac occurs within the state. The Illinois localities are scattered and often isolated areas. It should be kept in mind that the map is intended to show the general range o this poisonous shrub. Other disconnected areas, such as those found in Illinois, occur elsewhere within the general range.

drupes containing seeds (Figs. 16 and 20). Seedlings of poison-sumac may have *three* leaflets instead of the 7-13 found in the mature leaves. This three-leaflet condition may be used to show that the sumac is related to poison-ivy with its mature leaves made up of three leaflets. The poisonous clan of sumac and ivy has other characteristics, mentioned before, which give evidence of relationship.

In early winter some of the fruits of the poison-sumac, which help to identify the plant, may remain for a short time (Fig. 20). Hunters might use some caution when they may come in contact with both poison-ivy and poison-sumac in leafless winter condition. In autumn the leaves of poison-sumac generally become colored with brilliant shades of red, orange and russet which lure the careless or unsuspecting collector of autumn leaves. Both smooth sumac, *Rhus glabra* L., common along our roadsides, and shining sumac, *Rhus copallina* L., found locally in Illinois, have highly colored autumnal foliage and they are HARMLESS. Refer to key on page 25 for identification of Illinois sumacs).

Fortunately poison-sumac is of limited distribution in northern and northeastern Illinois counties where it grows in wet, acid soil of swampy and boggy areas and ditches. Charles C. Deam (1924)

Fig. 16. (Left). Poison-sumac *Rhus vernix* L. Note loose clusters of small white fruits or drupes. Flowers and fruits of poison-sumac are on the *sides* of the twigs and NOT terminal as in harmless sumacs (Figs. 18-19). Each leaf has 7-13 leaflets and complete leaves are arranged alternately on twigs. Leaves and flowers appear on *new* growth each year. Photo by John Gerard.

Fig. 17. (Right). Leaflets of one complete leaf of poison-sumac are usually entire (without marginal notches and lobes). This shrub, which generally grows in wet places, may vary from one to twenty feet in height.

stated that in Indiana poison-sumac died out in boggy areas which had been drained. Deam also considered this sumac the most poisonous of all Indiana plants likely to be encountered. The Illinois records of the poisonous shrub are from scattered areas in six counties: McHenry, Lake, Cook, Kankakee, Woodford and Coles. The presence of poison-sumac in Woodford County, on the Illinois River, and in Coles County, which is the most southern locality record for the state, requires some comment. We know, because of climatic changes and glaciations, that soils and vegetation of Illinois were once very much unlike the present. Occurrence of poison-sumac in Woodford and Coles Counties may indicate remnants or relicts of a previously more abundant distribution in Illinois. The map (Fig. 15) includes the northeastern corner of the state, but the two disconnected and local areas outside the general range should be noted. In the United States poison-sumac may be found from Maine southward through the Atlantic Coast States to northern Florida and along the Gulf States to eastern Texas. Inland it grows from Maine to eastern Minnesota, south across northeastern Illinois, Indiana and Ohio. The distribution as shown on the map indicates the *general area,* and occurrence of poison-sumac within some of this area is known to be local or in widely scattered "patches."

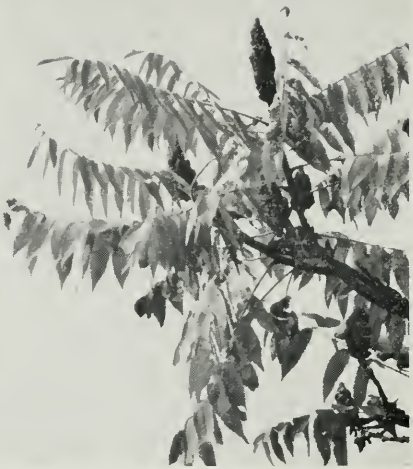

Fig. 18. (Left). Harmless staghorn sumac, *Rhus typhina* Var. *dissecta* Rehd., has 9-29 serrate or deeply notched leaflets in each leaf. Young branches are fuzzy. Compact clusters of red fruits, at lower left, often remain on the shrub all winter.

Fig. 19. (Right). Harmless smooth-sumac, *Rhus glabra* L., has 11-31 closely serrate leaflets in one leaf. This sumac is common along roadsides where its leaves become brilliant red and orange in autumn. The compact, spike-like clusters of red fruits are shown in the upper center.

Harmless Sumacs

The harmless (non-poisonous), pinnate-leaved kinds of sumacs in Illinois are: Staghorn, *Rhus typhina* L. and variety *dissecta* Rehd., (Fig. 18); smooth sumac, *Rhus glabra* L., (Fig. 19); and the dwarf or shining sumac, *Rhus copallina* L. All of these have compact, closely-set, spike-like clusters of *red* fruits (Figs. 18, 19 and 20). Staghorn sumac, with fuzzy young branches and leaflets sometimes finely cut or dissected, is planted and often escapes cultivation. Smooth sumac is common along roadsides, and its flaming red and orange autumn leaves can be picked without danger of subsequent dermatitis. The dwarf or shining sumac, a shrub smaller than the first two named above, grows in scattered or local areas over Illinois. The main leaf axis, to which the leaflets are attached in this dwarf sumac, is winged or has leaf-like extensions which *none* of the other American sumacs possess. The small flowers of all of the harmless, pinnate-leaved sumacs appear *after* the leaves are nearly full-grown.

Another harmless, *three-leaflet* sumac, *Rhus aromatica* Ait. (Fig. 12), must be called to attention since its three leaflets may cause confusion with poison ivy. This fragrant sumac is a shrub, never a climbing plant with aerial roots, producing clusters of hairy, *red* fruits. The small, yellowish flowers of fragrant sumac occur in spikes on the shrub *before* the leaves appear in spring or just as new leaf growth develops.

The following simple key will help you identify poison-ivy, poison-sumac, and the harmless sumacs in Illinois.

1. Shrubs (never climbing), leaves pinnate or feather-like with 7 to 31 leaflets. Flowers appear *after* leaves develop.

    2. Leaflets 7 to 13 and seldom having notches. Poisonous shrubs with loose, *white* fruits. . . . . Poison-sumac (Rhus vernix L.)

    2. Leaflets 7 to 31 with notched or serrated edges. Non-poisonous shrubs with compact, spike-like, *red* fruits.

    3. Branches hairy, plants tall. . . . . Staghorn sumac (Rhus typhina L. and R. typhina var. dissecta Rehd.)

    3. Branches smooth, both tall and low shrubs.

    4. Main axis of the leaf winged, foliage glossy. . . . . Shining sumac (Rhus copallina L.)

    4. Main axis of the leaf not winged, foliage dull. . . . . Smooth sumac (Rhus glabra L.)

1. Shrubs (sometimes climbing), 3 leaflets.

    5. Leaflets nearly always with notches, flowers appearing before leaves develop, fruits *red*. Non-poisonous shrubs, never climbing. . . Fragrant sumac (Rhus aromatica Ait.)

    5. Leaflets variable, some notched or unnotched, flowers appearing after leaves develop, fruits *white*. Poisonous shrubs, often climbing. . . . . Poison-ivy (Rhus radicans L.)

NATURE OF THE POISONOUS SUBSTANCE

Some of the earliest attempts to explain the dermatitis caused by poison-ivy and poison-sumac were obscured by superstitions. There is little doubt that American Indians, early explorers and colonists knew about the plant which caused ". . . reddness, itchinge and lastly blysters, . . ." according to Captain John Smith. Another interesting anecdote, and far more truthful, was recorded by Francis Parkman in his famous story, THE OREGON TRAIL. This account of western travels begun in 1846 with his friend Quincy A. Shaw says: . . . "In the morning Shaw found himself poisoned by the plant known as 'poison ivy', in such a manner that it was impossible for him to travel . . . Shaw lay seriously ill for a week . . ."* The locality was evidently southeastern Wyoming. Thus over a century ago poison-ivy made a man incapable of travel on the great plains.

One of the early explanations of ivy poisoning was that the plant gave off invisible vapors which, when they were inhaled or permitted to touch the skin, caused poisoning. The invisible vapor idea was probably influenced by repeated and exaggerated stories of the "deadly upas tree" of the East Indies. This tree incorrectly

* "The Oregon Trail" by Francis Parkman. Used by permission of Holt, Rinehart and Winston, Inc., publishers.

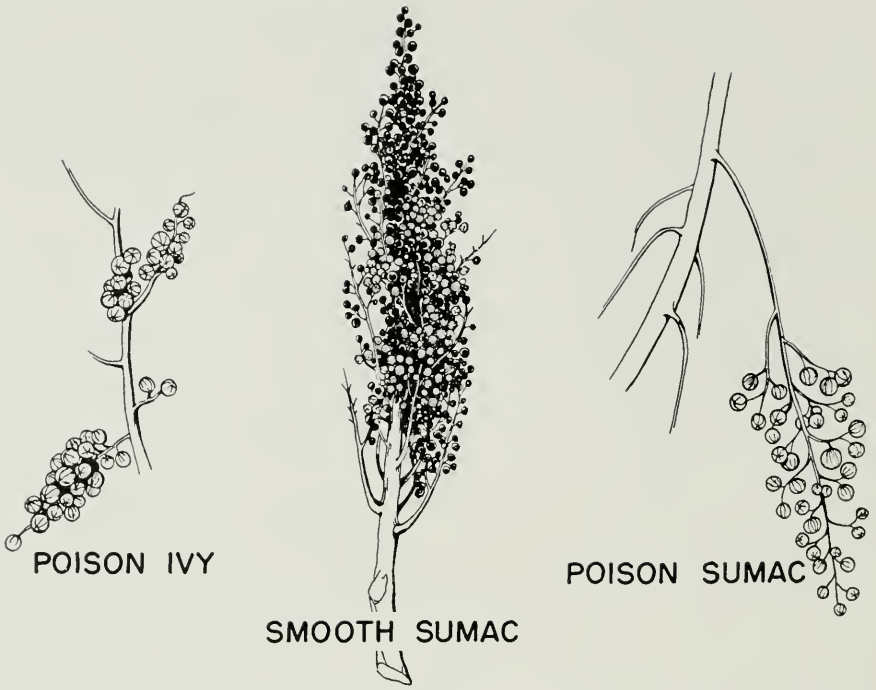

Fig. 20. Drawings show the fruits, containing seeds, of poison-ivy, smooth-sumac, and poison-sumac. For comparison note short, bunched fruits of poison-ivy (left), and more loosely arranged fruits of poison-sumac (right). Fine lines on the WHITE fruits of both poison-ivy and poison-sumac are typical markings. Harmless, smooth-sumac (center) has a stiff, upright, spike-like, cluster of dark RED, hairy fruits.

was said to be poisonous to the extent that no one dared approach it for fear of death. The upas tree is *Antiaris toxicaria* Lesch., a plant of the Mulberry Family. It has been cultivated with no harmful effects, but its milky sap is poisonous. In the late eighteenth century attempts were made to distill masses of poison-ivy leaves, twigs, and even the fruit. Distillation was an obvious way to prove, one way or another, that the vapor was poisonous or that something else would have to be found as the poisoning agent. Results of the distillations finally showed that the volatile (gaseous) part was NOT responsible for dermatitis but what remained in the flask or still as residue was HIGHLY TOXIC and caused typical poison-ivy dermatitis. In 1858 J. Khittel attempted the first chemical investigation of poison ivy. Khittel was influenced by the opinion that the substance causing the skin irritation was volatile and as a result he accomplished very little. A paper by James B. McNair, THE TRANSMISSION OF RHUS POISON FROM PLANT TO PERSON, gives accounts of experiments regarding the nature of the poisonous, oily substance in poison-ivy and how it caused dermatitis. Some of McNair's

other papers, listed in the references, are technical but worth reading, and he gives 142 titles for articles pertaining to poison ivy.

The poison sap canals or resin canals are special cells found in the leaves, roots, stems, and fruit of poison-ivy, poison-sumac, and poison-oak and all carry a related poisonous sap emulsion which turns black upon exposure to air and drying. In many other plants the sap, of quite different chemical composition, may be harmless and even useful such as that found in sugar maple sap which is simple sugar water in the woody cells of the trees and which may become maple syrup or sugar by special processing.

In the book PHARMACOGNOSY by Gathercoal and Wirth (1947), the authors call the poisonous substance in the ivy sap "a phenolic oily resin named toxicodendrol, ..." Others have used the name urushiol (SCIENCE NEWS LETTER for July 9, 1949, pp. 26-27). Carl O. Rosendahl (1955) calls it an oleoresin. All have used different names for the poisonous substance in the ivy sap.

The irritant contained in the sticky sap of poison-ivy, poison-oak and poison-sumac is a CONTACT skin poison or irritant which, when left on the skin only a few minutes, causes the final burning, itching and blistering typical of ivy poisoning. The "urushiol" contained in the sap of *Rhus verniciflua,* the Asiatic sumac, was known in Japan before it was identified as a similar irritating agent in the sap of our North American poison-ivy and poison-sumac. Recent studies indicate that the chemical composition of the poison in these plants is not identical, and continued research will give more exact information. One writer reports that he is not susceptible to poison-ivy but is allergic to poison-sumac. Therefore, it is not advisable to say that the chemical composition is identical for all poisons carried by the sumac group.

There are always many accounts of persons who are, or believe themselves to be, immune from dermatitis caused by poison-ivy and its relatives. If you are one of those fortunate individuals who does not suffer after contact with recognized poison ivy, remember that such immunity may be a matter of degree and over-exposure can make you susceptible. It is very unwise to expose one's self repeatedly to poison-ivy. The intrepid individual who brags about immunity and shows his contempt for the ivy plant by grasping and crushing leaves may sometime find himself with a case of ivy dermatitis. If a person has even very mild skin irritation, he is likely to be less immune and more susceptible each time he is exposed. Perhaps the skin of human beings varies in its ability to resist action of the oily sap. No races of man are competely immune but dark or pigmented skin may be more resistant than light or white skin. Sensitivity probably decreases with age which means that older persons are less likely to suffer from exposure to poison-ivy than younger people and children.

Extra caution should be used when the ivy plants are in full leaf, for it is then that they are most likely to cause dermatitis. In early summer the leaves are full of sap which they produce, and a plant in full leaf furnishes much more surface for human beings to contact. The leaf surface itself has no exposed poisonous sap, and

gently brushing or merely touching poison-ivy plants might not cause the symptoms of ivy dermatitis. Perhaps this accounts for the statements of individuals who claim that poison-ivy does not irritate their skin. The poisonous sap is released only when leaves, twigs and roots are broken or crushed. Dr. A. M. Kligman (1958) says, "The consequence is that the leaf must be bruised to produce a dermatitis. Uninjured leaves are completely innocuous." Kligman's paper, given as a reference, is technical but his list of 105 additional papers is important and useful.

In summer the peak of ivy poisoning occurs when millions of people visit woodlands, parks and recreation areas. It is especially important to remove ivy plants growing along a well-used pathway or in any area in which they may be broken by trampling. The sap-filled broken twigs and leaves are in the *most effective* condition for poisoning bare skin of hands, legs and ankles as one walks along a path through brushy areas. In winter (Fig. 11), if the twigs of poison-ivy and poison-sumac are broken and some sap is released, the ivy dermatitis will result. A Boy Scout, known to the writer, once camped in winter in an area where poison-ivy grew. The plants were not recognized and this young man suffered severe dermatitis from poison-ivy in leafless winter condition. Eating leaves or the white fruits of the ivy plant or poison-sumac will cause severe internal poisoning, irritation, and distress in the alimentary tract. NEVER eat any part of these plants! Young Indian boys were said to have eaten poison-ivy in an attempt to gain immunity to the poison. Such stories are part of the folk-lore, incorrect accounts and exaggerations passed on to posterity generation after generation. Experiments have shown that the colorful red and orange leaves of poison-ivy in autumn are poisonous but less toxic than yellow and green leaves. At this time there is less sap in leaves and stems, and chemical changes take place as winter conditions approach. However, poison-ivy can cause dermatitis at any time of the year!

Air-borne particles of soot and ash as part of the smoke from burning poison-ivy can carry some of the irritating, *non volatile* sap. This may account for reports that the poison is vaporized by heat. Although the vaporization reason given originally was incorrect, it is very important to AVOID smoke from burning poison-ivy. Remember also that articles of clothing, especially shoes, and other items such as baseball bats, golf clubs, tools and the fur of pets and wild animals may carry the poisonous sap, even in a dried condition, which later may be brought in contact with skin of individuals sensitive to ivy poison. The sap of poison-ivy, under very dry conditions, may remain potent for long periods of time. Warm, moist conditions will cause deterioration or change in the poisonous chemical composition of the sap in a relatively short time. It has been shown in experiments that even minute amounts of the sap can cause dermatitis. An account regarding ivy poisoning from an unsuspected source is found in the story of an elderly lady who never went outside her house; however, in summer she had ivy dermatitis invariably. Eventually it was learned that her pet dog roamed in the woods and carried the dried sap of poison-ivy on his coat.

LEARN TO AVOID IVY POISONING

It may seem to readers that we exaggerate the case for poison-ivy. Millions of dollars for treatment are spent each year and many hours of work are lost by those who have had severe or recurring trouble with ivy dermatitis. Danger of secondary infection with or after the original poisoning can require as much medical attention as the first burning, itching and blistering. It seems that the old "ounce of prevention" is worth far more than a "pound of cure." LEARN TO RECOGNIZE POISON-IVY AND ITS RELATIVES AND AVOID CONTACT. The next most important means of avoiding the objectionable plants would be to have them removed from pathways on hiking trails, around beaches and in special areas set aside for picnics and outdoor activities. It is obvious that all poison-ivy will not disappear, but it can be cleared or controlled by cutting, mowing, burning and, as a last resort, by use of chemical sprays in *specific areas* in which many thousands of people congregate for recreation year after year.* Suitable clothing which covers arms and legs will help to avoid much trouble in known poison ivy areas. Such clothing will need laundering before being handled or worn again, and shoes can be scrubbed with soap and water. Poison-ivy should be eliminated in swimming areas and on beaches where clothing of bathers can furnish very little protection. Methods of removing and eradicating these undesirable plants are described in FARMER'S BULLETIN No. 1972, prepared by the U. S. Department of Agriculture, available from the Superintendent of Documents, Washington, D. C. 20250. This same booklet contains a discussion of methods of treatment for ivy poisoning. A double-frame color filmstrip, "Identification and control of poison-ivy", can be obtained at a small cost from the Extension Editorial Office, College of Agriculture, University of Illinois, Urbana, 61803.

TREATMENT AFTER EXPOSURE

It is not likely that treatment can be immediately received after accidental exposure to poison-ivy unless you have previously visited your doctor who might prescribe some immunization procedures. The greatest problem is that most individuals do not stop to consider the possibility of encountering poison-ivy or whether this or that plant *is* poison-ivy. You can return from a summer outing with a case of ivy dermatitis without even knowing you have been in an area in which the plants grow. Let us emphasize again that (1) removal or control of poison-ivy in recreational areas is as important as (2) teaching people to identify it.

The interval for burning, itching, and finally water-filled blisters to appear varies a great deal. This, again, may depend on some differences in human skin; and the symptoms of dermatitis can develop within a few hours or even days later. The most important factor in using any remedy or treatment is TIME. Unless you can

* Poison-ivy should be eliminated in specific areas where it is most likely to be encountered. This does not mean that all of it should be destroyed. Careless and indiscriminate use of chemical sprays which may kill desirable plants and wildlife is NOT recommended by this writer.

wash the poisonous sap away within 5 to 10 minutes after exposure, you are likely to be in trouble. Wash the entire body at once with any bland soap and then change clothing which must be laundered before being worn again. It is, of course, very obvious that washing is not always possible immediately after known contact with such irritating plants, and a tub or shower *after* outdoor activity is generally too late to avoid dermatitis *if* you have been exposed to or in contact with poison-ivy. The blister fluid associated with ivy poisoning does not spread the irritation; but it is the oily, poisonous resin which is transferred to other skin areas by rubbing or scratching.

There are some simple preparations for treatment of ivy poisoning. An easily prepared "remedy" can be made by using equal parts of baking soda and cornstarch with enough water to form a paste or a lotion. Wet packs of boric acid are helpful in case of severely poisoned eyelids and swollen eyes. Calamine lotion can be used to soothe the discomfort of itching, burning skin. Preparations containing iron salts are likely to cause permanent tattoo effects especially if skin in the area of application is broken.

The best advice to be given after known poison-ivy symptoms appear is to see your doctor as soon as possible. He knows more about you and your skin, and what has poisoned you, than any label on a bottle or pill in a box. Your doctor is the only person who should advise you on desensitizing procedures. The U. S. Department of Health, Education and Welfare provides a small, useful pamphlet on poison-ivy in the Public Health Service, Health Information Series No. 65, available from the Superintendent of Documents, Washington, D. C., 20250.

OTHER MEMBERS OF THE SUMAC FAMILY

There are about 600 kinds or species of plants included in the entire Cashew (Sumac) Family or Anacardiaceae, including both harmful and useful members. Many of them are unknown to us since they grow in tropical regions, but our poison-ivy and poison-sumac are the important subjects of this booklet. We shall have to mention, however, a few other members of the plant family as part of the story. The smoke-tree, *Cotinus obovatus* Raf., grows as a harmless wild plant in parts of southern United States. The European smoke-tree, *Cotinus coggygria* Scop., sometimes called red sumac, is often planted as an ornamental shrub or small tree. Both the European smoke-tree and the Mediterranean sumac, *Rhus coriaria,* were known before the beginning of the seventeenth century.

When Linnaeus named poison-sumac, *Rhus vernix,* he very likely used "vernix" to mean varnish, but the Asiatic varnish- or lacquer-producing plant is a very different sumac known as *Rhus verniciflua* Stokes. The beautiful black lacquer made from the sap of this poisonous Asiatic sumac is used to give a fine, glossy finish to various decorative objects. Cases of dermatitis often result from using or handling articles made from the wood or other parts of some poisonous members of the Sumac Family. The writer repeats a story about American servicemen in Japan where their contact with beautifully lacquered toilet seats and bars left them with cases

of dermatitis from sources difficult to determine. It should not be assumed, however, that any object with a black, glossy finish is likely to cause dermatitis.

Another member of the Sumac Family is the cashew tree, *Anacardium occidentale* L., which bears a fleshy, pear-like thickened stem called the "cashew apple" in the end of which is embedded the large, bean-shaped cashew nut. The edible nut itself has two shells between which a brown oil containing irritating cardol is produced. It is the cashew nut *shell,* used in creating such novelty items as stirring sticks with voodoo doll heads, which contains the irritating, blistering cardol. The well known cashew nut, when roasted, is an edible and important article of commerce. Dock workers, who handled drums of imported oil from cashew nut shells, frequently suffered dermatitis until the source and cause were finally determined and corrected. Coral sumac, doctor gum or poison-wood, *Metopium toxiferum* (L.) Krug & Urban, is a shrub or small tree which grows in pinelands and hammocks of south Florida and the Florida Keys. Its sap causes severe dermatitis similar to that caused by poison-ivy and poison-sumac.

The pistachio nuts used to flavor ice cream are produced by a tree, *Pistachia vera* L., another member of the Sumac Family. The tropical mango, *Mangifera indica* L., contains an irritant in the oily rind, but the edible inner pulp has a pleasant flavor and sweet, sticky juice. The black, acrid sap of another tropical tree, *Semecarpus anacardium* L., is used to make indelible marks (India ink) on cloth, and its use in printing or marking cloth may be a source of skin irritation. Ink made from lamp black or carbon is neither poisonous nor irritating.

The Sumac Family, therefore, includes a wide variety of plants: useful, harmless members, those producing both useful and poisonous parts, and some entirely poisonous to touch or eat.

HARSH-LEAVED PLANTS AND NETTLES

Many harsh-leaved plants sometimes cause itching and unpleasant sensations when they come in contact with skin of face, arms and legs. These may be irritating but *not at all* poisonous in the same terms as are poison-ivy and poison-sumac. The surfaces of most plant leaves range from smooth to rough and merely hairy to densely woolly. Sunflowers, hops, and ragweeds, as examples, have hairy, rough leaf surfaces with large, simple hairs often coarse enough to scratch the skin. Some other leaves, such as hard maple, feel smooth to touch; and others in contrast, like the common mullein, feel woolly and soft when handled. Scratches from coarse-leaved plants may become infected and should not be left untreated.

Among the nettles, common nettle, *Urtica procera* Muhl., and wood nettle, *Laportea canadensis* (L.) Gaud. (Fig. 21), have stinging hairs on leaves and stems which, when touched, cause unpleasant burning, stinging and itching. The stinging hairs of nettles are hollow structures of plant cells with the hollow space containing an irritating fluid (Fig. 22). The tips of such hairs are easily broken

Fig. 21. These photos are from pressed herbarium specimens of nettles. Wood nettle, *Laportea canadensis* (L.) Gaud., on the left, a plant of shady, wet woodlands, has broad leaves alternately arranged on the stem. Common nettle, *Urtica procera* Muhl., on the right, with much narrower leaves arranged oppositely on the stem, is often found growing in moist fields and along roadsides. Stinging hairs occur on all parts of the plants and are larger on main stems. These nettles are not poisonous plants and only their stinging hairs make them undesirable to touch.

by touching or grasping; and after penetrating the skin, the broken hairs release the stinging fluid. This nettle fluid was at one time identified as formic acid, but later researches indicate its uncertain chemical composition. These nettles are common, wild plants of our woods and roadsides. Leaves of common nettle have an opposite arrangement on the stems while those of wood nettle are arranged alternately. A shrubby, tree-like nettle from Queensland, Australia, *Laportea moroides* Wedd., possesses virulently stinging hairs, but its large leaves and purple, mulberry-like fruits make it a showy greenhouse plant in cold climates.

All of the plants described in the two paragraphs above have simple, single leaves with *no* leaflets like those described for poison-ivy and poison-sumac. Our common nettle grows in patches in low ground of roadsides and fields, and the wood nettle is found in damp or wet, shady woodlands. The stinging hairs of wood nettle will penetrate clothing, but you need to be more careful about touching poison-ivy than being "stung" by the nettles. Washing with soap and water followed by application of hand lotion will generally bring relief after an encounter with common or wood nettles.

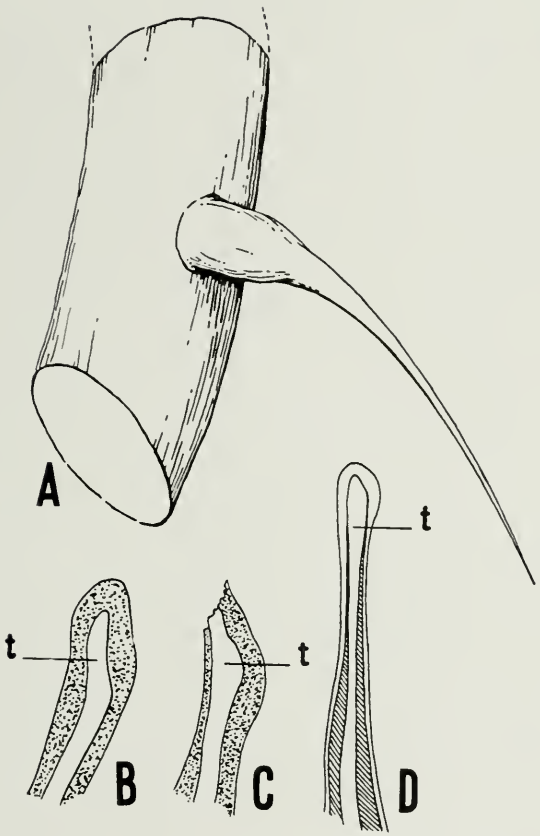

Fig. 22. This series of drawings illustrates enlarged stinging hairs of nettles. (A) Very much enlarged drawing of a single, stinging hair on a stem. (D) A highly magnified tip of one of these hairs. (B) Tip of a hair with the hollow area (t) containing stinging fluid. (C) Broken tip indicates release of the fluid.

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